INTT analysis code

- ビームが出始めたので、BNLの外からも解析してみた。

- これまでのTreeはデータ構造がイベント毎でないので、イベント毎のTreeを作ってみた。

- Code : intt0の

INTT/hachiya/convertInttRaw/test1 : 変換コード

ConvertInttData.h/cc InttEvent.h/cc LinkDef.h

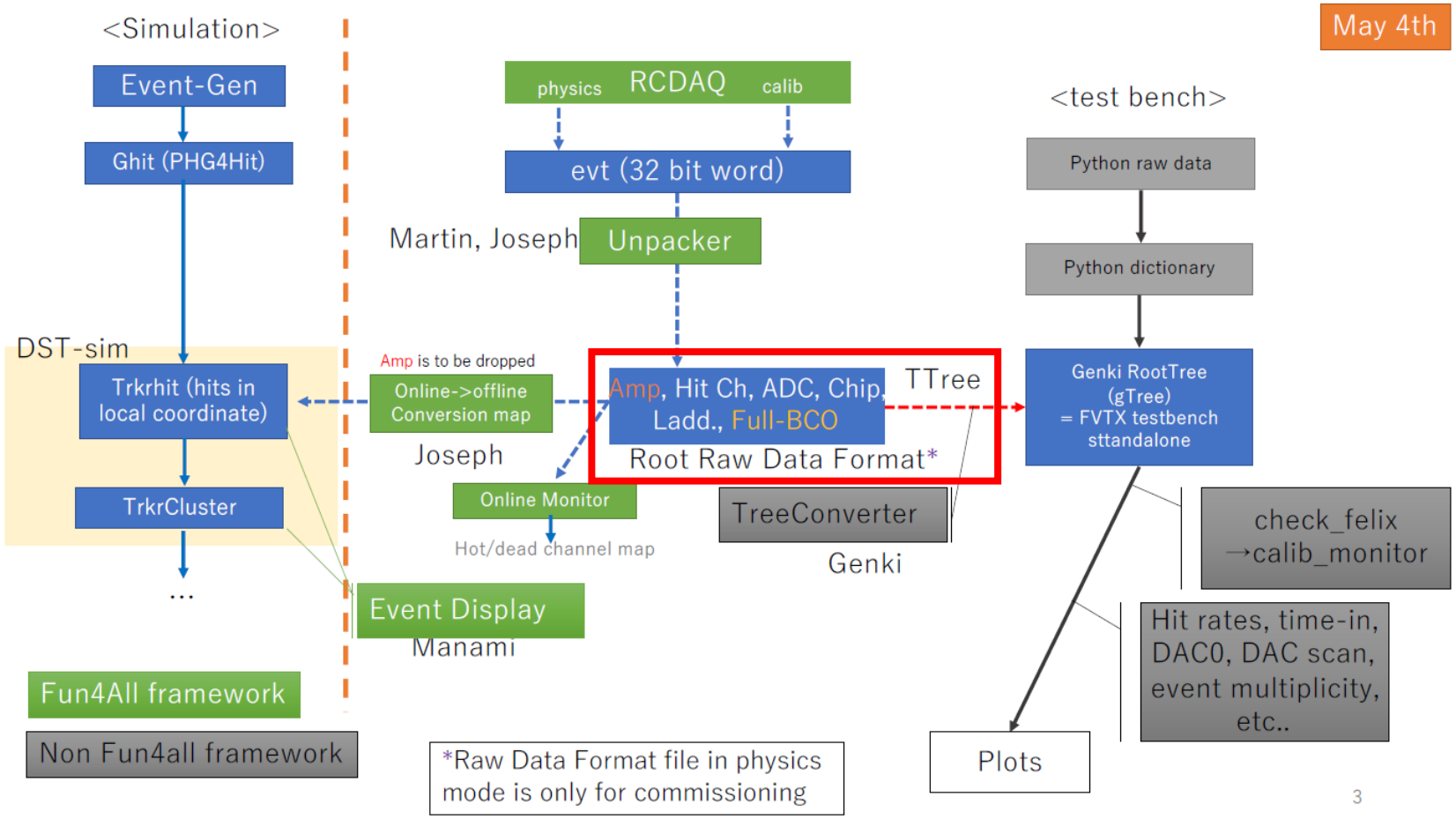
runConvertInttData.C

INTT/hachiya/convertInttRaw/test1/anlysis : 解析コード

AnalyzeInttEvent.h/cc LinkDef.h

runAnalysis.C

Event Based INTT data



- Root RawData Format
  - Event based INTT object in DST
- Genki's rootfile
  - Hit based tree
  - originally from calibration data
  - Recently by Joseph
- I made event-based tree
  - Contain all information

- 解析の流れ
  - ROOTファイル変換：　Evt ⇒InttEvent(ROOTファイル)
  - ROOTファイル解析：
    - InttEventオブジェクトが含まれるTreeを読み、ヒストグラムを作る。
      - Rawhit　→　クラスタリング
      - クラスタリングは隣り合ったChを1まとめにし、その平均位置をヒット位置とした。
        - ADCの重みによる、重み付き平均。
        - ADCはDAC値に変換後使用。　クラスタのADCや重みの計算に使用

(My) Event-based INTT data tree

- InttEvent
  - eventSequence (from EVT)
  - nHits (nhits from all ladders in this event)
  - InttHit[] (variable length array of hit objects by TClonesArray)

- InttHit
  - int pid;
  - int adc; ampl, chip_id, chan_id, module;
  - int bco;
  - Long64_t bco_full;
  - int evt;

  - int roc, barrel, layer, ladder, arm;
  - int full_fphx, full_roc;

Data from run 8059

- Before/ after sorting

```
TFile**         calib_intt0-00008059-0000.root
 TFile*         calib_intt0-00008059-0000.root
  KEY: TTree    tree;2  tree
  KEY: TTree    tree;1  tree
root [2] tree->Print()
******************************************************************************
*Tree    :tree      : tree                                                   *
*Entries :    15269 : Total =       176580538 bytes  File  Size =   15927317 *
*        :          : Tree compression factor =  11.18                       *
******************************************************************************
*Branch  :event                                                              *
*Entries :    15269 : BranchElement (see below)                              *
*.............................................................................*
*Br    0 :fUniqueID : UInt_t                                                 *
*Entries :    15269 : Total  Size=      62189 bytes  File Size  =       1133 *
*Baskets :        8 : Basket Size=       8000 bytes  Compression=  54.44     *
*.............................................................................*
*Br    1 :fBits     : UInt_t                                                 *
*Entries :    15269 : Total  Size=     124861 bytes  File Size  =      22738 *
*Baskets :       24 : Basket Size=       8000 bytes  Compression=   5.46     *
*.............................................................................*
*Br    2 :evtSeq    : Int_t                                                  *
*Entries :    15269 : Total  Size=      62153 bytes  File Size  =      22240 *
*Baskets :        8 : Basket Size=       8000 bytes  Compression=   2.77     *
*.............................................................................*
*Br    3 :fNhits    : Int_t                                                  *
*Entries :    15269 : Total  Size=      62153 bytes  File Size  =      16262 *
*Baskets :        8 : Basket Size=       8000 bytes  Compression=   3.79     *
*.............................................................................*
*Br    4 :fhitArray : Int_t fhitArray_                                       *
*Entries :    15269 : Total  Size=     566032 bytes  File Size  =      16270 *
*Baskets :        8 : Basket Size=       8000 bytes  Compression=   3.79     *
*.............................................................................*
*Br    5 :fhitArray.fUniqueID : UInt_t fUniqueID[fhitArray_]                 *
*Entries :    15269 : Total  Size=    9283999 bytes  File Size  =     230838 *
*Baskets :     1325 : Basket Size=       8000 bytes  Compression=  40.10     *
```

```
file : calib_intt0-00008059-0000.root
ctor InttEvent
Evt : 2
  Nhits : 568
   module chip_id chan_id adc ampl
        0      10     119   0    0
        0      23     105   3    0
        0      18      85   5    0
        0       0       0   0    0
        0       8     125   7    0
        0       7       5   7    0
        0      24     104   2    0
        0      24     105   1    0
        0      16      11   1    0
        0      19      97   3    0
        0      10     120   1    0
        0      19      98   5    0
        0       1     117   2    0
        0      21      89   7    0
        0      21      90   4    0
        1       0       0   0    0
        1       5      38   1    0
        1       5      39   7    0
        1       6      18   1    0
        1       7      44   4    0
        1       8      32   1    0
        1      14     124   2    0
        1       8      33   7    0
        1      17      56   0    0
        1       9      21   1    0
        1      17      57   4    0
        1       9      22   7    0
        1      18     109   0    0
```

```
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file : calib_intt0-00008059-0000.root
ctor InttEvent
Evt : 2
  Nhits : 568
   module chip_id chan_id adc ampl
        0       0       0   0    0
        0       1     117   2    0
        0       7       5   7    0
        0       8     125   7    0
        0      10     119   0    0
        0      10     120   1    0
        0      16      11   1    0
        0      18      85   5    0
        0      19      97   3    0
        0      19      98   5    0
        0      21      89   7    0
        0      21      90   4    0
        0      23     105   3    0
        0      24     104   2    0
        0      24     105   1    0
        1       0       0   0    0
        1       2       2   0    0
        1       3       0   2    0
        1       3       1   7    0
        1       3       2   1    0
        1       4      49   7    0
        1       4      50   6    0
        1       4      51   7    0
        1       4      52   7    0
        1       4      53   4    0
        1       5      38   1    0
        1       5      39   7    0
```
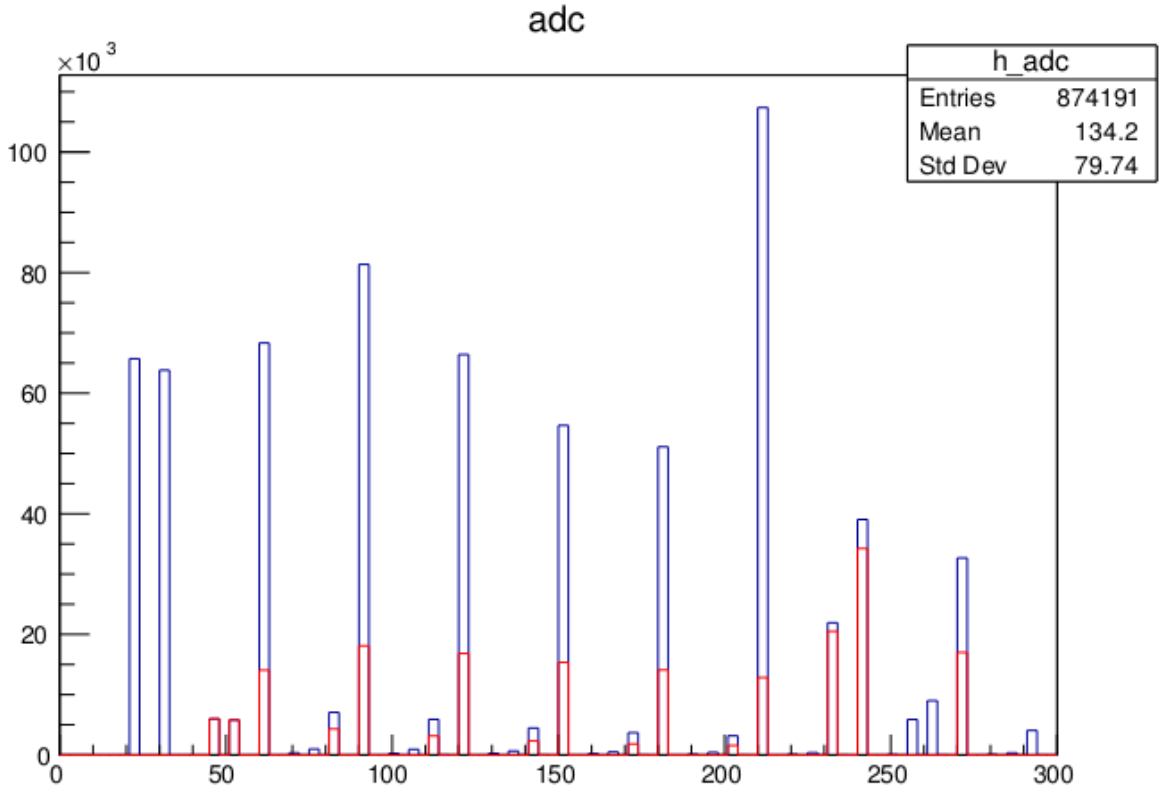
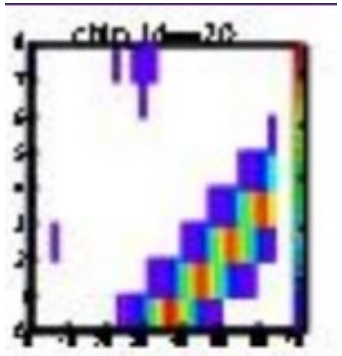

Clustering also done





- Assuming DAC
  - 23, 30, 60, 90, 120, 150, 210
- Data: 8059 (Last friday)
- Peak like structure @ 90
- Large ADC seen
  - Real large signal?
  - Small pulse but ADC=7?